Summary

THE INFLUENCE of ultraviolet irradiation of the operating room on the incidence of postoperative wound infection was investigated by means of a double-blind, randomized study in five institutions. Over a two-year period, 14,854 operations and 15,613 incisions were studied in relation to postoperative wound infection.

Although ultraviolet irradiation reduced the number of airborne bacteria in the operating room, the wound infection rate in the entire series following operation was 7.4 per cent in irradiated rooms and 7.5 per cent in unirradiated rooms. The only category of wounds that benefited significantly from the use of ultraviolet radiation was the *refined-clean* group, in which the postoperative infection rate was reduced from 3.8 to 2.9 per cent. Even this beneficial effect, which was confined to a category representing only 19.2 per cent of all infections analyzed, was lost in the over-all experience, offset by an apparent detrimental effect of irradiation in nonclean wounds.

The over-all infection rates at each of the five participating hospitals varied from a low of 3.0 to a high of 11.7 per cent. Because of the random selection of patients, operating rooms, and operating procedures, neither patient selection nor type of operation can be held to account for this wide variation. Numerous patient characteristics were recorded at the time of operation, and examined with respect to their relationship to wound infection rate.

The age of the patient apparently exerts a direct influence on wound infection rate, which rises steadily from the 15- to 24-year-old group to the 65- to 74-year-old group. The sex of the patient apparently is only indirectly related to risk of infection, for in operations in which similar degrees of bacterial contamination can be expected to occur there is hardly a difference in the risk of infection between sexes. The race of the patient also plays at most a minor role in determining wound infection rates.

Diabetic patients showed no increased susceptibility to infection, when compared with nondiabetics of similar ages. Steroid therapy appears to affect wound infection rates adversely, and, even when other factors are considered, may itself increase the susceptibility of some patients to infection.

The extremely obese patients appear to be more susceptible to wound infection, in some way that is directly related to obesity itself. However, there is little evidence that the malnourished patient is more susceptible to infection than a patient of normal nutritional status undergoing a comparable operative procedure. Patients who harbor infection remote from the operative incision are likely to have greater wound infection rates than those without such remote infections. Wound infection rates rise steadily as the duration of the operation increases, and duration appears to be a primary determinant of risk of infection.

Neither urgency of operation, time of day when the operation is performed, season, nor month appears to exert any substantial influence on infection rates.

Regardless of other associated factors recognized in the study as increasing infection rate, the duration of preoperative hospitalization appears to influence the infection rate independently. In view of the case selection inherent in this variable, a positive conclusion must be qualified.

The use of prophylactic antibiotics was associated with a much higher wound infection rate. Adjustment for all recognizable factors that might be involved did not change the finding that patients who received antibiotics intended to prevent wound infection actually manifested an increased wound infection rate. In view of the obvious case selection, the significance of this finding can be determined only by further, carefully controlled studies in which the administration of prophylactic antibiotics is thoroughly randomized.

During the study various bacteriologic characteristics related to operative infections were surveyed. In particular, the respiratory tracts of operating-room personnel, the air in the operating room, and the postoperative wounds themselves were all monitored for bacteriologic contamination. In addition, one institution studied in detail the presence of contaminating bacteria in the operative wound just before the completion of the operation. It may be said that these surveys confirmed the belief that the presence of bacteria in the wound at the end of an operation does not necessarily foretell the subsequent development of infection. Wounds found at operation to be contaminated by coagulase-positive staphylococci had the highest infection rates, but only 26.7 per cent of the infections that occurred at the hospital that conducted this special survey (i.e., of operative, as opposed to postoperative, wound cultures) yielded coagulase-positive staphylococci, and they were not always the same as those isolated during the operation.

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